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Section Electrical and Autonomous Vehicles

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Section **Electrical and Autonomous Vehicles**

Section Editor-in-Chief

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Section Information

This Section "Electrical and Autonomous Vehicles" addresses the different perspectives of design, development, and usage of electric and autonomous vehicles, as well as their impact on people's lives, on cities, and on power and energy systems.

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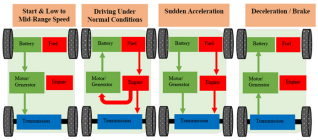
Selected Papers

DOI: 10.3390/electronics10161910

Review of Electric Vehicle Technologies, Charging Methods, Standards and Optimization Techniques

Authors: Syed Muhammad Arif, Tjing Lie, Boon Chong Seet, Soumia Ayyadi and Kristian Jensen

Abstract: This paper presents a state-of-the-art review of electric vehicle technology, charging methods, standards, and optimization techniques. The essential characteristics of Hybrid Electric Vehicle (HEV) and Electric Vehicle (EV) are first discussed. Recent research on EV charging methods such as Battery Swap Station (BSS), Wireless Power Transfer (WPT), and Conductive Charging (CC) are then presented. This is followed by a discussion of EV standards such as charging levels and their configurations. Next, some of the most used optimization techniques for the sizing and placement of EV charging stations are analyzed. Finally, based on the insights gained, several recommendations are put forward for future research.

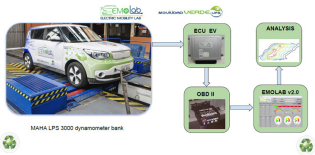


DOI: 10.3390/electronics10101199

A Novel Energy-Efficiency Optimization Approach Based on Driving Patterns Styles and Experimental Tests for Electric Vehicles

Authors: Juan Diego Valladolid, Diego Patino, Giambattista Gruosso, Carlos Adrián Correa-Flórez, José Vuelvas and Fabricio Espinoza

Abstract: This article proposes an energy-efficiency strategy based on the optimization of driving patterns for an electric vehicle (EV). The EV studied in this paper is a commercial vehicle only driven by a traction motor. The motor drives the front wheels indirectly through the differential drive. The electrical inverter model and the power-train efficiency are established by lookup tables determined by power tests in a dynamometric bank. The optimization problem is focused on maximizing energy-efficiency between the wheel power and battery pack, not only to maintain but also to improve its value by modifying the state of charge (SOC). The solution is found by means of a Particle Swarm Optimization (PSO) algorithm. The optimizer simulation results validate the increasing efficiency with the speed setpoint variations, and also show that the battery SOC is improved. The best results are obtained when the speed variation is between 5% and 6%.



DOI: 10.3390/electronics10070853

A Simulated Annealing Algorithm and Grid Map-Based UAV Coverage Path Planning Method for 3D Reconstruction

Authors: Sichen Xiao, Xiaojun Tan and Jinping Wang

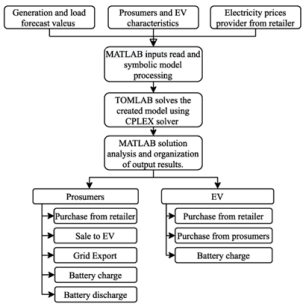
Abstract: With the extensive application of 3D maps, acquiring high-quality images with unmanned aerial vehicles (UAVs) for precise 3D reconstruction has become a prominent topic of study. In this research, we proposed a coverage path planning method for UAVs to achieve full coverage of a target area and to collect high-resolution images while considering the overlap ratio of the collected images and energy consumption of clustered UAVs. The overlap ratio of the collected image set is guaranteed through a map decomposition method, which can ensure that the reconstruction results will not get affected by model breaking. In consideration of the small battery capacity of common commercial quadrotor UAVs, ray-scan-based area division was adopted to segment the target area, and near-optimized paths in subareas were calculated by a simulated annealing algorithm to find near-optimized paths, which can achieve balanced task assignment for UAV formations and minimum energy consumption for each UAV. The proposed system was validated through a site experiment and achieved a reduction in path length of approximately 12.6% compared to the traditional zigzag path.

DOI: 10.3390/electronics10020129

An Optimization Model for Energy Community Costs Minimization Considering a Local Electricity Market between Prosumers and Electric Vehicles

Authors: Ricardo Faia, João Soares, Zita Vale and Juan Manuel Corchado

Abstract: Electric vehicles have emerged as one of the most promising technologies, and their mass introduction may pose threats to the electricity grid. Several solutions have been proposed in an attempt to overcome this challenge in order to ease the integration of electric vehicles. A promising concept that can contribute to the proliferation of electric vehicles is the local electricity market. In this way, consumers and prosumers may transact electricity between peers at the local community level, reducing congestion, energy costs and the necessity of intermediary players such as retailers. Thus, this paper proposes an optimization model that simulates an electric energy market between prosumers and electric vehicles. An energy community with different types of prosumers is considered (household, commercial and industrial), and each of them is equipped with a photovoltaic panel and a battery system. This market is considered local because it takes place within a distribution grid and a local energy community. A mixed-integer linear programming model is proposed to solve the local energy transaction problem. The results suggest that our approach can provide a reduction between 1.6% to 3.5% in community energy costs.



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2. Vehicles Technologies for Sustainable Smart Cities
Guest Editors: Nikolay Hinov, Darius Andriukaitis, Jožef Ritonja

3. Wireless Communications Security and Privacy for Connected and Autonomous Vehicles
Guest Editors: Vasileios Kouliaridis, Georgios Karopoulos and Jose Luis Hernandez-Ramos

4. Human Factors and Human-Computer Interaction in Automated Driving
Guest Editors: Marie-Hélène Abel and Alessandro Correa-Victorino

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Guest Editors: Shuguo Pan, Xiaolin Meng, Qiuzhao Zhang, Wang Gao and Qing Zhao

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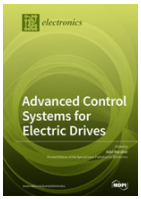
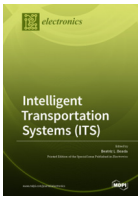


Advanced Control Systems for Electric Drives
Guest Editors: **Dr. Adel Merabet**



Intelligent Transportation Systems (ITS)
Guest Editors: **Prof. Dr. Beatriz L. Boada**

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